

AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions and listings of claims.

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Currently amended) ~~The method of claim 1~~ A method for reducing the restart time for a parallel application, the parallel application including a plurality of parallel operators, the method comprising:

repeating the following:

setting a time interval to a next checkpoint;

waiting until the time interval expires;

sending checkpoint requests to each of the plurality of parallel operators; and

receiving and processing messages from one or more of the plurality of parallel operators;

wherein receiving and processing messages from one or more of the plurality of parallel operators comprises:

receiving a checkpoint reject message from one of the plurality of parallel operators;

sending abandon checkpointing messages to the plurality of parallel operators; and

scheduling a new checkpoint.

6. (Currently amended) ~~The method of claim 1~~ A method for reducing the restart time for a parallel application, the parallel application including a plurality of parallel operators, the method comprising:

repeating the following:

setting a time interval to a next checkpoint;

waiting until the time interval expires;

sending checkpoint requests to each of the plurality of parallel operators; and

receiving and processing messages from one or more of the plurality of parallel operators:

wherein receiving and processing messages from one or more of the plurality of parallel operators comprises:

receiving a recoverable error message from one or more of the plurality of parallel operators;

sending abandon checkpointing messages to the plurality of parallel operators;

waiting for ready messages from all of the plurality of parallel operators; and

scheduling a new checkpoint.

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Canceled)

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Currently amended) ~~The method of claim 13 further comprising~~ A method for one of a plurality of parallel operators to record its state, the method comprising:

receiving a checkpoint request message on a control data stream;

waiting to enter a state suitable for checkpointing;

sending a response message on the control data stream; and

determining that the parallel operator is not in a state suitable for checkpointing;

and

wherein sending a response message on the control data stream comprises sending a checkpoint reject message on the control data stream.

17. (Original) The method of claim 16 further comprising:
experiencing a recoverable error; and wherein sending a response message on the
control data stream comprises
sending a recoverable error message on the control data stream.

18. (Original) The method of claim 16 further comprising:
experiencing a non-recoverable error; and wherein sending a response message on
the control data stream comprises
sending a non-recoverable error message on the control data stream.

19. (Canceled)

20. (Currently amended) ~~The computer program of claim 19~~ A computer
program, stored on a tangible storage medium, for use in reducing the restart time for a
parallel application, the parallel application comprising a plurality of parallel operators,
the computer program comprising:

a CRCF component which includes executable instructions that cause a computer to
repeat the following:

set a time interval to a next checkpoint;

wait until the time interval expires;

send checkpoint requests to the plurality of parallel operators;

receive and process messages from one or more of the plurality of parallel
operators; and

a plurality of parallel components, each of which is associated with one of the
plurality of parallel operators, and each of which includes executable instructions
that cause a computer to:

receive a checkpoint request message from the CRCF;

wait to enter a state suitable for checkpointing; and

send a checkpoint response message to the CRCF;

wherein

each of the parallel components include executable instructions that cause a
computer to:

determine that the parallel operator is not in a state suitable for checkpointing;
and, in sending a response message to the CRCF, the parallel component
associated with that parallel operator causes the computer to send a
checkpoint reject message to the CRCF; and
in receiving and processing messages from one or more of the plurality of parallel
operators, the CRCF causes the computer to:
receive the checkpoint reject message; and
send abandon checkpoint messages to the plurality of parallel operators in
response to the checkpoint reject message.

21. (Currently amended) ~~The computer program of claim 19~~ A computer
program, stored on a tangible storage medium, for use in reducing the restart time for a
parallel application, the parallel application comprising a plurality of parallel operators,
the computer program comprising:

a CRCF component which includes executable instructions that cause a computer to
repeat the following:

set a time interval to a next checkpoint;

wait until the time interval expires;

send checkpoint requests to the plurality of parallel operators;

receive and process messages from one or more of the plurality of parallel
operators; and

a plurality of parallel components, each of which is associated with one of the
plurality of parallel operators, and each of which includes executable instructions
that cause a computer to:

receive a checkpoint request message from the CRCF;

wait to enter a state suitable for checkpointing; and

send a checkpoint response message to the CRCF;

wherein

each of the parallel components include executable instructions that cause a
computer to:

determine that one or more of the parallel operators has experienced a
recoverable error; and, in sending a response message to the CRCF,

the parallel component or components associated with the one or more parallel operators that experienced the recoverable error or errors cause the computer to:

send a recoverable error message to the CRCF;

proceed with recovery; and

send a ready message to the CRCF; and

in receiving and processing messages from one or more of the plurality of parallel operators, the CRCF causes the computer to:

receive the recoverable error message;

send abandon checkpoint messages to the plurality of parallel

operators in response to the recoverable error message;

wait for the ready messages;

receive the ready messages; and

schedule a checkpoint.

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)